Implicit and Explicit Memory for Music in Old and Young Adults

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The effect of aging on implicit and explicit memory was studied with familiar and unfamiliar melodies. After a study phase, implicit memory was assessed with an affect task in which subjects rated their liking of each melody. Explicit memory was assessed with a recognition task. In the affect task, both old and young adults exhibited higher preference for studied than nonstudied unfamiliar melodies, whereas they equally liked familiar melodies. In the recognition task, familiar melodies were best recognized, with the elderly performing significantly worse than the young adults. The results support the notion that the aging process spares implicit memory but impairs explicit memory, extending the dissociation to the auditory nonverbal domain. © 1999 Academic Press

Introduction

Explicit memory, which refers to conscious recollection of past episodes, appears to be impaired by the aging process. In contrast, implicit memory, which is defined as a facilitation in performance attributable to the prior presentation of an episode, seems to be spared in the elderly. This dissociation has been established for visually presented verbal material; however, little is known about auditory memory processes and even less about nonverbal ones. In order to address this issue, we developed an experimental paradigm that allows one to compare explicit and implicit memory for melodies (Peretz, Gaudreau, & Bonnel, in press).

To assess implicit memory, we exploited the mere exposure effect (e.g., Zajonc, 1968), which refers to the increase in liking of melodies as a result of a prior exposure. In a previous study including young university students (Peretz et al., in press), we found that a single prior exposure to unfamiliar melodies increased preference for these melodies, whereas familiar melodies were equally liked, irrespective of prior study. Conversely, with the recognition task, we found that the familiar melodies were best recognized. Thus, affect and recognition judgments were differently influenced by subjects’ familiarity with the material, suggesting the operation of distinct implicit and explicit memory processes. In the present study, we exploited the same paradigm to investigate the effects of aging on implicit and explicit memory for music.

Method

Participants. Forty elderly (mean age 70.4) and 40 young adults (mean age 22.8) matched for sex and years of education participated. All participants were nonmusicians and raised in a French-speaking culture to ensure
a shared knowledge of popular music. Twenty elderly and young adults performed the affect task while the remainder (20 others in each age group) performed the recognition task.

**Material and procedure.** Eighty melodic lines taken from the popular repertoire served as stimuli. Two sets (A and B) were constructed so that each contained 20 familiar and 20 unfamiliar melodies. During the study phase, subjects heard 40 melodies—for example Set A—and indicated their familiarity for each excerpt. In the test phase, subjects heard the 40 studied melodies (for example, Set A) mixed with 40 nonstudied melodies (Set B). In the affect task, subjects rated their liking of each melody using a 10-point scale in which 1 meant "I don't like it" and 10, "I like it a lot." In the recognition task, subjects had to identify the melodies which were heard in the study phase, using a 10-point scale in which 1 meant "no, I certainly have not heard their excerpt in the prior test" and 10, "yes, I certainly have heard this excerpt in the prior test."

**Results**

**Affect task.** An ANOVA with Group (young vs old) as the between-subjects factor, Presentation (studied vs nonstudied), and Familiarity (familiar vs unfamiliar melodies) as within-subjects factors was performed on the individual mean ratings obtained in the affect task. The analysis yielded a significant Group effect, $F(1, 19) = 5.4, p < .05$, indicating that the rating of elderly were higher for all melodies. The Group variable, however, did not enter into any significant interaction (all $F < 1$). Overall, familiar melodies were generally preferred, as revealed by the main effect of Familiarity, with $F(1, 19) = 76.92, p < .001$. More importantly, a significant Familiarity × Presentation interaction, with $F(1, 19) = 8.7, p < .005$, was obtained. Prior study increases liking of unfamiliar melodies, with $t(19) = 3.937, p = .001$, but it does not influence affect rating for familiar melodies ($t(19) = 0.84$). Thus, old and young adults displayed the same pattern of results in the affect task. (See Table 12.)

<table>
<thead>
<tr>
<th></th>
<th>Familiar melodies</th>
<th>Unfamiliar melodies</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Presented</td>
<td>Nonpresented</td>
</tr>
<tr>
<td>Affect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Young</td>
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<td>6.4</td>
</tr>
<tr>
<td>Recognition</td>
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<td></td>
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<tr>
<td>Old</td>
<td>7.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Young</td>
<td>7.8</td>
<td>3.2</td>
</tr>
</tbody>
</table>

**Table 12**

Mean Ratings of Old and Young Adults in the Affect and Recognition Tasks as a Function of Prior Exposure and Familiarity with the Melodies
Recognition task. The same ANOVA as the one computed on the affect data was performed on the recognition ratings. It yielded several interactions. There was a significant interaction between Familiarity and Presentation, with \( F(1, 19) = 80.1, p < .001 \), showing that recognition is better for familiar than unfamiliar melodies. The Group by Familiarity interaction also reached significance, with \( F(1, 19) = 11.17, p < .01 \), indicating that young adults gave generally higher scores than the elderly for unfamiliar melodies. Finally, as expected, there was an interaction between Group and Presentation, with \( F(1, 19) = 11.17, p < .01 \), revealing that young adults were generally more accurate than the elderly in discriminating the studied melodies from the nonstudied ones.

Conclusion

The results provide further evidence for preserved implicit memory in the presence of impaired explicit memory in the elderly. The originality of the present study lies in the use of an affect task to assess implicit memory in the elderly and in the use of melodies to assess memory.

The affect task has been shown to reflect the contribution of implicit as opposed to explicit memory in the visual domain (Seamon et al., 1995) as well as in the auditory musical domain (Peretz et al., in press). To demonstrate the link between the affect task and the use of implicit memory, manipulation of various factors, such as prior familiarity with the material, has been studied. Here we replicate the differential role played by familiarity on liking and recognition judgments in both young and old subjects. We add, however, a new dissociation variable that is related to the aging process. In doing so, we suggest that the domain of memorization is irrelevant. Aging appears to spare implicit memory and to impair explicit memory in the visual and auditory modality similarly, be it verbal or nonverbal material. This rather general finding is compatible with the notion that explicit memory is more effortful than implicit memory, hence being more vulnerable to a resource limitation in the elderly.

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